

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

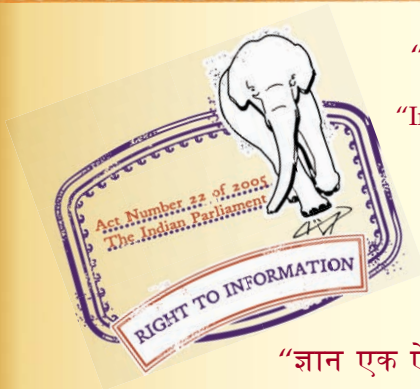
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 3972-2-9 (1991): Methods of test for vitreous enamelware, Part 2: Test methods, Section 9: Resistance to dilute sulphuric acid [CHD 9: Ceramicware]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS 3972 (Part 2/Sec 9) : 1991

Indian Standard

METHODS OF TEST FOR VITREOUS ENAMELWARE

PART 2 TEST METHODS

Section 9 Resistance to Dilute Sulphuric Acid

(First Revision)

UDC 666.293 : 620.193.5

© BIS 1991

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 1991

Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ceramicware Sectional Committee had been approved by the Division Council.

The Committee while reviewing IS 3972 : 1968 'Methods of test for vitreous enamelware' decided to publish this standard in two parts. Part 1 of this standard deals with production of specimens for testing in two sections, namely, Section 1 Enamelled sheet steel and Section 2 Enamelled cast iron. Part 2 of this standard deals with various test methods applicable to vitreous enamelled sheet steel and vitreous enamelled cast iron. The Committee also decided that Part 2 shall be brought out in various sections and each section shall deal with a particular test method. Sections 1, 2, 3, 4, 5 and 6 covering resistance to citric acid at room temperature and boiling temperature, low and high voltage test for detection and locating defects, resistance to boiling water and water vapour, resistance to thermal shock, resistance to hot alkali (sodium hydroxide) and reflectance and specular gloss, respectively, have already been published while Section 7 and 8 covering resistance to boiling hydrochloric acid and resistance to heat, respectively, are under print.

This section (Part 2/Sec 9) of the standard prescribes the method for determining the resistance to dilute sulphuric acid at room temperature which has been aligned with ISO/DIS 8290 'Vitreous and porcelain enamels — Determination of resistance to sulphuric acid at room temperature' issued by the International Organization for Standardization (ISO).

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'.

Indian Standard

METHODS OF TEST FOR VITREOUS ENAMELWARE

PART 2 TEST METHODS

Section 9 Resistance to Dilute Sulphuric Acid

(First Revision)

1 SCOPE

This standard (Part 2/Sec 9) prescribes a method of test for the determination of resistance to dilute sulphuric acid at room temperature of vitreous enamelled articles and also specifies a method for classifying the test results.

NOTES

1 This standard is particularly intended for testing of vitreous enamelled articles that come in contact with products of combustion containing sulphuric acid.

2 This standard is not applicable to matt vitreous enamels or to vitreous enamels that come in contact with weak acids or hot strong acids or to vitreous enamelled articles for use in the chemical industry.

2 REFERENCES

Indian Standards listed below are necessary adjuncts to this standard:

IS No.	Title
1070 : 1977	Water for general laboratory use (<i>second revision</i>)
2717 : 1979	Glossary of terms relating to vitreous enamelware and ceramic-metal-system (<i>first revision</i>)
3972 (Part 1/ Sec 1) : 1982	Methods of test for vitreous enamelware : Part 1 production of specimens for testing, Section 1 Enamelled sheet steel
3972 (Part 1/ Sec 2) : 1982	Methods of test for vitreous enamelware : Part 1 Production of specimens for testing, Section 2 Enamelled cast iron

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2717 : 1979 shall apply.

4 SAMPLING

Representative samples of vitreous enamelware shall be drawn as specified in individual material specifications.

5 PRINCIPLE

5.1 A part of the surface of a test specimen is exposed under defined conditions to attack by dilute sulphuric acid solution.

5.2 Classification of resistance to attack by dilute sulphuric acid is based on the appearance and cleanability of the enamelled surface.

6 QUALITY OF REAGENTS

6.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070 : 1977) shall be used.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

6.2 Sulphuric Acid (H_2SO_4)

Measure 41.0 ml of 0.5 M sulphuric acid in the graduated measuring cylinder, transfer to the 100 ml volumetric flask and dilute to the mark with water. This will be 20 g/l solution.

6.3 Degreasing Solvent

Solvents, such as trichloroethylene are suitable for cleaning the test specimen.

6.4 Titanium Dioxide

7 APPARATUS

7.1 Graduated Measuring Cylinder, 50-ml capacity.

7.2 One-Mark Volumetric Flask, 100-ml capacity.

7.3 Pipette

7.4 Filter Papers

Thickness less than 0.18 mm, diameter approximately 30 mm and thickness more than 0.38 mm and diameter approximately 25 mm.

NOTE — Only to be used for testing of curved surface.

7.5 Towel, white cotton or flax.

7.6 Pencil, hardness HB (or equivalent).

7.7 Watch Glass

Made of polyethylene or glass, external diameter approximately 30 mm.

7.8 Electric Lamp

40 W inside white bulb (for example, siliconized).

8 TEST SPECIMENS

8.1 The test specimen may be commercial items, parts thereof or test pieces specially prepared in accordance with IS 3972 (Part 1/Sec 1) : 1982 or IS 3972 (Part 2/Sec 1) : 1982 depending upon the base metal used for enamelling.

8.2 Each test specimen shall be cleaned with the degreasing solvent (6.3), then rinsed in hot water until the water spreads evenly on the surface and finally dried by dabbing (not rubbing) with clean towel (7.5).

9 PROCEDURE

9.1 Attack by the Testing Solution

9.1.1 Using the pipette (7.3) place a few drops of the sulphuric acid solution (6.2) on each test specimen and keep at room temperature during the whole period of the test, ensuring that there is a continuous treatment area, the diameter of which shall be less than that of the watch glass (7.7). Cover the treatment area immediately with the watch glass.

9.1.2 In the case of curved surfaces, place the thin filter paper (7.4) on the area to be treated. On the top of this put the thicker filter paper (7.4). Apply drops of the dilute sulphuric acid solution (6.2) to the top filter paper (7.4) until both filter papers are saturated. Cover the filter papers to prevent evaporation with a watch glass (7.7) and keep the specimen at room temperature.

9.1.3 After 15 min \pm 30 seconds, remove the watch glass (7.7) and filter papers (7.4), if any, wash the test specimen with water and then dry it by dabbing (not wiping) with filter paper (7.4).

NOTE — When using tap water, ensure that a residual film is not allowed to form; otherwise the classification may be affected.

9.2 Determination

9.2.1 Examine each test specimen within 2 hours of the completion of the attack by the testing solution (6.2).

9.2.2 For the evaluation, only that part of the surface of the test specimen which has been subjected to attack by acid shall be considered as treated area.

9.2.3 The evaluation is based on the examination specified in 9.2.3.1 to 9.2.3.4 which shall be in accordance with the test scheme and classification given in the Fig. 1 and Table 1.

Table 1 Classification

(Clause 9.2.3)

Class	Visual Examination	Reflection Test	Rubbering Test	
			Dry	Moist
AA	Pass	—	Pass	—
A	Pass	—	Fail	Pass
A	Fail	Pass	—	Pass
B	Pass	—	Fail	Fail
B	Fail	Pass	—	Fail
C	Fail	Partly Fail	—	—
Unclassified (Not resistant to sulphuric acid)	Fail	Totally Fail	—	—

9.2.3.1 Visual examination

View, using normal or corrected vision, the different areas at varying angles, at a distance of 250 mm from the test specimen, without a magnifying glass, in order to ascertain whether the treated area differs from the non-treated area (for example, if the brightness or the colour has changed, or if some spots have appeared). Carry out the examination in daylight, avoiding direct sunlight. The test specimen may also be examined in artificial light provided the latter is uniform and strong enough. If the treated area differs in any respect from the non-treated area, the test specimen fails in the visual examination.

9.2.3.2 Rubbing test (dry)

Draw, using the pencil (7.6) some approximately parallel lines, across both the treated and non-treated areas. For black and dark coloured enamels, rub the titanium dioxide (6.4) on to the two areas instead of using a pencil. If, on rubbing the test specimen with the dry towel (7.5) the markings on the treated area are more difficult to remove than those on the non-treated area, the test specimen fails the dry rubbing test.

9.2.3.3 Reflection test

- Set the test specimen in such a way that the image of the bulb of the electric lamp (7.8), located 250 - 450 mm away from the specimen, reflects on the non-treated areas with an angle of incidence of 45°. Then watch the image of the bulb on the non-treated area while the test specimen is slowly moved so that the image moves into the treated area. If no blurring of the image is observed while it

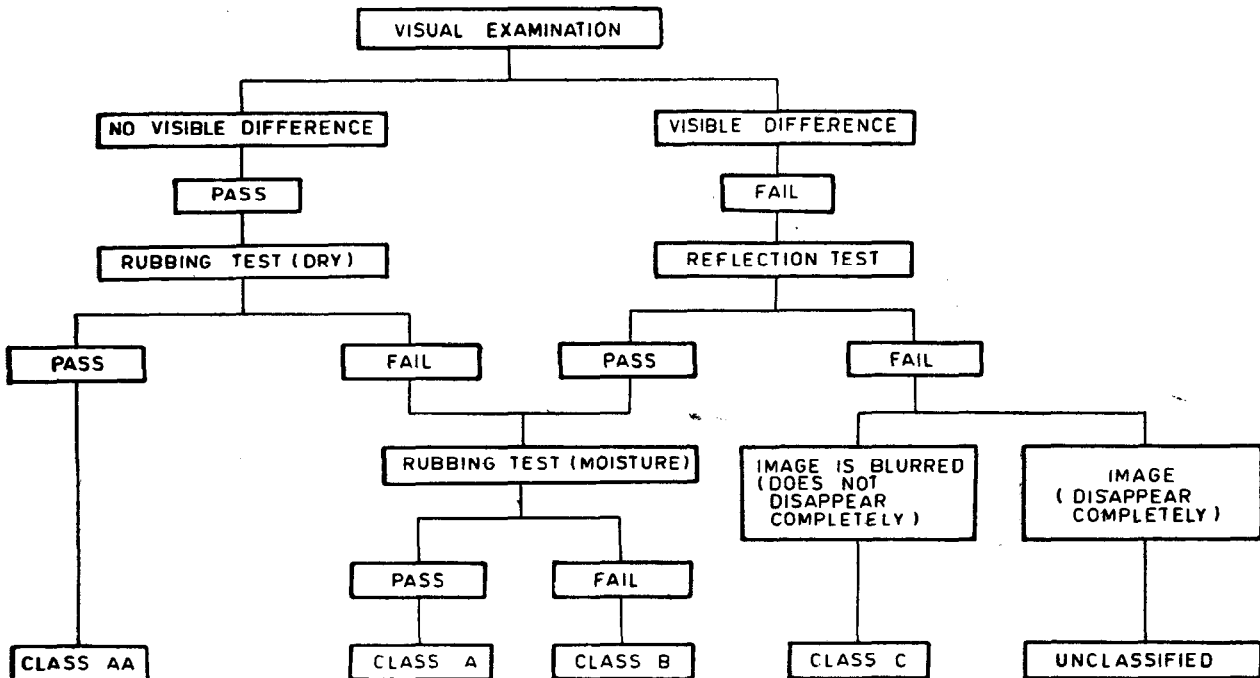


FIG. 1 TEST SCHEME

passes from one area to the other, the test specimen passes the reflection test.

- b) If the test specimen fails the reflection test it is necessary to distinguish, in the passage from one area to the other, whether there is a blurring or a complete disappearance of the image.

9.2.3.4 Rubbing test (moist)

Carry out the test specified in 9.2.3.2 but use a towel (7.5) which has been moistened with water and thoroughly wrung out (do not use any soap or detergent). If the markings on the treated area are more difficult to remove than

those on the non-treated area, the test specimen fails in the moist rubbing test.

10 CLASSIFICATION OF RESULTS

10.1 Depending upon the results of the determination which have been performed in accordance with 9.2, the enamels are conveniently classified as shown in the Table 1.

10.2 In the case of a failed visual examination (9.2.3.1) and a totally failed reflection test (9.2.3.3), the enamel is treated as having failed in resistance to dilute sulphuric acid test at room temperature.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publication), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc : No. CHD 09 (9691)

Amendments Issued Since Publication		
Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Telephone
{ 331 01 31
{ 331 13 75

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola
CALCUTTA 700054

37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036

53 38 43

Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113

2350216

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093

6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI.
HYDERABAD. JAIPUR. KANPUR. PATNA. THIRUVANANTHAPURAM.

AMENDMENT NO. 1 FEBRUARY 2006
TO
IS 3972 (PART 2/SEC 9) : 1991 METHODS OF TEST FOR
VITREOUS ENAMELWARE

PART 2 TEST METHODS

Section 9 Resistance to Dilute Sulphuric Acid

(First Revision)

(Page 1, clause 2) — Substitute the following for the existing clause:

2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)
2717 : 1979	Glossary of terms relating to vitreous enamelware and ceramic-metal systems (<i>first revision</i>)
3972 (Part 1/Sec 1) : 1982	Methods of test for vitreous enamelware : Part 1 Production of specimens for testing, Section 1 Enamelled sheet steel (<i>first revision</i>)
3972 (Part 1/Sec 2) : 1982	Methods of test for vitreous enamelware : Part 1 Production of specimens for testing, Section 2 Enamelled cast iron (<i>first revision</i>)'.

(Page 1, clause 3, line 2) — Substitute 'IS 2717' for 'IS 2717 : 1979'.

(Page 1, clause 6.1, line 2) — Substitute 'IS 1070' for 'IS 1070 : 1977'.

(Page 2, clause 8.1, line 3) — Substitute 'IS 3972 (Part 1/Sec 1)' for 'IS 3972 (Part 1/Sec 1) : 1982'.

(Page 2, clause 8.1, line 4) — Substitute 'IS 3972 (Part 1/ Sec 2)' for 'IS 3972 (Part 2/Sec 1) : 1982'.

(CHD 9)